

Salt fluoridation in France since 1986

Summary

In 1985, the production and use of fluoridated salt was authorized in France. Domestic salt both with added fluoride (at 250 ppm) and without fluoride has been on the market since 1986. It was recommended to avoid the consumption of fluoridated salt if the local drinking water contained more than 0.5 milligrams of fluoride per litre. The legislation has never been modified since, except for a few developments such as the permission given to school canteens in 1993 to use fluoridated salt, provided canteen managers made sure that the drinking water contained no more than 0.5 milligrams of fluoride per litre. Epidemiological surveys about fluoridated salt in France are few, but they point in the same direction: decrease of DMFT and DMFS values, evident for the period 1986–1993 but minimal from 1993 to 1998. In 1999 and 2002, epidemiological comparative surveys were carried out in Montpellier (France) and Heidelberg (Germany) among 12-year-old schoolchildren. A decrease in caries prevalence was found in both towns, particularly in Heidelberg. On the other hand, the two cities showed some slight differences resulting from public health policy, from individual preventive habits, and from an earlier introduction of fluoridated salt in France.

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Introduction

In many countries, systemic fluorides have been recommended and adopted by public health administrators. The fluoridation of drinking water had seen a conspicuous development in English speaking countries between 1960 and 1990. In France, water fluoridation has never been authorised, mainly for two reasons, first, a technical reason (too many local authorities, about 8,000, plus individual wells), second, an ethic reason (do not oblige an entire population to ingest fluoride, without having the freedom of choice). However, dental caries are still a serious public health concern in France. So, following Switzerland's example (MARTHALER 2003), fluoridated salt (FS) was really seen as an appropriate alternative for our country.

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Evolution of salt fluoridation

In France, iodised salt was introduced to the market in 1952. Thirty-four years later, in 1986, for the first time fluoridated domestic salt became available by decree (ARRÊTÉ MINISTÉRIEL du 31 octobre 1985). This important decree allowed the adjunction of potassium fluoride to domestic salt. However, non-fluoridated salt still had to be available for any consumer who wished to buy it. The domestic salt fluoridation was adopted at a proportion of 250 milligrams per kilo of fluoride potassium ($\pm 15\%$). At each production level of FS, different controls are made, according to the European Salt Producer's Association (ESPA). On the cover of the packet, it reads: "Do not consume if drinking water contains more than 0.5 milligrams of fluoride per litre." In France, only 3.7% of the population have drinking water at such a level.

The market share of iodised and FS is shown in table I. Fluoridated salt reached a 50% share of the market in 1991 (CAHEN et al. 1993) and 60% in 1993 (HESCOT et al. 1995) and has since declined to 27% (Tab. I). It was officially permitted in school canteens in 1993 but with the same restriction as in the domestic market for sales of the salt: "only if drinking water does not contain more than 0.5 milligrams of fluoride per litre." Actually, FS is not used in all French school canteens. The exact proportion has not been assessed.

The last official recommendation was made by a decree (ARRÊTÉ MINISTÉRIEL du 28 mai 1997) and concerned the tolerance in the composition of the domestic salt and the upper limits of its constituent materials. Currently, the official recommendation by Agence Française de Sécurité Sanitaire des Aliments (AFSSA 2003) for an optimal prophylactic dose is 0.05 milligrams of ingested fluoride per kilogram bodyweight and per day. If the drinking water contains more than 0.5 milligrams of fluoride per litre, FS should not be used.

Below the age of two, a child consumes almost no domestic salt. The statistics for adult consumption of domestic salt in France showed a mean value of 2–4 grams per day per capita, and only 40 to 70% of this amount is actually ingested.

The sizes of the packages in which FS is available are 250 grams, 500 grams and 1,000 grams. Actually, FS is available in two forms (coarse or fine), and always in association with iodine. The concentrations of potassium fluoride (250 mg/kg) and sodium iodine (10–15 mg of iodine/kg) are labelled on every package.

Caries epidemiology

National epidemiological surveys conducted in France among children at the ages 6, 9 and 12 years clearly showed a decline in dental caries from 1987 to 1993 (HESCOT et al. 1995). The mean DMFT decreased from 4.2 in 1987 to 2.07 in 1993 among 12-year-old children. A further national survey using the same methodology resulted in an average DMFT score of 1.9, which is only slightly below the results of 1993 (BOURGEAIS et al. 2004).

Tab. I Market share of iodised and fluoridated salt in small packages (Source: Comité des Salines de France)

	1999	2000	2001	2002	2003
With fluoride and iodine	31%	28%	28%	26%	27%
With iodine only	27%	24%	17%	18%	20%
Total with iodine	58%	52%	45%	44%	47%
No fluoride, no iodine	42%	48%	55%	56%	53%

In southern France, regional surveys (city of Montpellier) were carried out in 1999 and 2002 among 12-year-old schoolchildren (828 and 815 respectively). They were coordinated with surveys in Heidelberg (Germany), at approximately the same period (864 and 838 schoolchildren respectively), conducted by the same examiner (SCHULTE et al. 2001).

When the first survey started, FS had been available for twelve years in Montpellier and seven years in Heidelberg. The mean DMFT was 1.42 and the proportion of children with caries-free dentition (DMFT=0, age 12) was 46.9% in Montpellier. In Heidelberg they were, 1.56 and 43.5% respectively (no significant differences). FS was used by 73.3% of the families of 12-year-olds from Montpellier, while the corresponding percentage was 38.8% in Heidelberg.

In the survey of 2002 (KLEMMME et al. 2004), three years later, the mean DMFT was 1.29 (1.42 in 1999) while the percentage of caries-free Montpellier children increased to 49.6% (46.9% in 1999). In Heidelberg, it was found to be 1.15 and 54.8% respectively (1.56 and 43.5% in 1999). The increase of caries-free children was statistically significant (chi-square, $p=0.001$) in Heidelberg, but not in Montpellier (chi-square, $p=0.44$). The decrease of DMFT was statistically significant (Mann-Whitney test, $p=0.001$) in Heidelberg, but not in Montpellier (Mann-Whitney test, $p=0.08$).

Discussion

There has been a strong reduction of caries prevalence in France from 1987 to 1993 but not from 1993 to 1998. The lack of decline after 1993 would correspond to the constant market share of FS. In Montpellier, from 1999 to 2002, the use of FS (families + canteens) had remained almost at the same level (70.4%), while the users' percentage increased in Heidelberg from 38.8 to 58.5%. This result could explain the statistically significant increase of caries-free children and the significant decrease of DMFT in Heidelberg. Taking into account only FS bought by the families (not including FS from canteen intake), the users' percentage was 46% in Montpellier. It is very difficult to determine the part FS played in this dental health improvement, but in countries using water fluoridation, the increase in fluoride consumption is obviously correlated to the decrease in caries prevalence.

The consumption of FS in Montpellier, which is higher than the national average, may be explained by the nearby presence of the most important national saltern company (about 40 km from Montpellier). This firm has a very good reputation locally and an efficient promotion of its products. Moreover, school canteens in Montpellier have already received permission to use FS (since 1993), but not those from Heidelberg. However, topical fluorides and fissure sealants had a higher frequency of use in Heidelberg.

About 85% of the French population lives in regions where the drinking water contains less than 0.3 milligrams of fluoride per litre. The fluorosis prevalence is still very low and has remained unchanged for ten years (2.75%) (HESCOT & ROLAND, 1999). Only mild or very mild levels were reported. In our French-German survey, fluorosis frequency values were low, and moreover, the frequencies were always higher in the group which did not use FS than in the group which used it (no statistical difference). But the influence of fluoride tablets intake, frequently used for French infants, was not taken into account.

The successful use of FS raises some questions, such as that concerning permission to use FS in all schools and municipal restaurants, which would mean that full liberty of choice would

no longer be maintained. The fluorosis prevalence would probably be unchanged (SCHULTE et al. 2003). But the dental caries experience among adults is still an important public health concern in France. Henceforth, today's French population needs more efficient information and probably significant promotional advertising, in line with that received by fluoridated toothpaste for many years. At the moment, the only promotion is written on the salt packet: "Fluoridated salt is good for caries prevention." A significant number of young French people do not use it, probably because they are still not aware of its existence.

Résumé

L'eau fluorée n'ayant jamais été autorisée en France, les autorités de Santé Publique ont adopté en 1985 une autre stratégie pour lutter contre les taux encore élevés de prévalence carieuse. En pratique, l'introduction du sel fluoré a débuté dès 1986: on pouvait alors trouver en consommation courante des boîtes de sel fluoré, mais aussi de sel non fluoré. La dose choisie a été de 250 mg de fluorure de potassium par kilo de sel. Il a été recommandé toutefois de ne pas consommer ce sel fluoré si l'eau de boisson contenait plus de 0,5 mg de fluor par litre. La législation n'a plus été modifiée depuis. Simplement quelques évolutions mineures comme l'autorisation de la consommation du sel fluoré dans les cantines scolaires à partir de 1993, à condition que les exploitants desdits établissements se soient assurés que l'eau distribuée dans la localité ne présente pas une teneur en fluor supérieure à 0,5 mg par litre. Les études épidémiologiques sur la question sont peu nombreuses en France, mais elles tendent toutes à la même conclusion: réduction des indices DMFT et DMFS, nette entre 1986 et 1993, moindre entre 1993 et 1998. En 1999 et 2002, à la suite d'une étude épidémiologique franco-allemande comparative entre deux grandes villes, les résultats ont mis en évidence une amélioration de la prévalence carieuse dans les deux villes. Cette amélioration s'est avérée statistiquement significative à Heidelberg, où l'usage du sel fluoré avait augmenté. Cependant ces deux villes présentent quelques différences résultant des pays auxquels elles appartiennent: au niveau de la politique de santé publique, des habitudes préventives individuelles, et une autorisation d'utilisation du sel fluoré intervenue cinq ans plus tôt en France.

Zusammenfassung

In Frankreich wurde die Fluoridierung des Trinkwassers nie zugelassen, doch bewilligten die öffentlichen Gesundheitsdienste 1985 die Fluoridierung des Haushaltszuges (250 ppm F). Dessen Verkauf begann im Herbst 1986. Es wurde zugleich empfohlen, dieses Salz nur dort zu benutzen, wo der Fluoridgehalt des örtlichen Trinkwassers 0,5 ppm nicht übersteigt. Diese Regelung gilt noch immer. 1993 wurde zusätzlich bewilligt, dass das Kochsalz für Schulkantinen ebenfalls fluoridiert sein darf, wenn sich deren Betreiber eines Fluoridgehalts des Trinkwassers von höchstens 0,5 ppm F vergewissert. In Frankreich gibt es nur wenige epide-

miologische Erhebungen zum Gebrauch des fluoridierten Kochsalzes, doch zeigen alle in dieselbe Richtung: Rückgang der DMFT- und DMFS-Durchschnitte in landesweiten Erhebungen von 1986 bis 1997, aber kaum eine Veränderung von 1997 bis 2002. In den Jahren 1999 und 2002 wurden in Montpellier und Heidelberg parallele Erhebungen durchgeführt. In Montpellier war keine deutliche Kariesabnahme festzustellen, aber in Heidelberg ging der Befall in derselben Periode nachweisbar zurück. In Bezug auf die relevanten Einflussfaktoren ist festzuhalten, dass die meisten Kinder in Montpellier zuhause und in den Schulkantinen fluoridiertes Salz benutzten; der Anteil der Konsumenten war 1999 und 2002 weitgehend derselbe. In Heidelberg stieg die Benutzung des fluoridierten Salzes dagegen an; dort wurden auch zusätzlich lokale Fluoridierungen und Versiegelungen zur Kariesverhütung eingesetzt.

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